Chapter 21
Charcot Arthropathy

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Case Presentation

The patient is a 52-year-old female with diabetes mellitus and neuropathy who presents with a progressive left ankle deformity over the last 2 years. She wears an Arizona brace for support.

Examination revealed a severe varus deformity at the ankle. She had palpable pulses and monofilament testing was consistent with neuropathy. Laterally, a 3 cm callus was present, but there was no ulceration or signs of infection. There was also no erythema or warmth.

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Initial Films

Standing films of the ankle (AP, lateral, mortise) and foot (AP, lateral, mortise) were obtained. They demonstrated a medial dislocation of the tibiotalar joint with diffuse osteopenia, nearly complete osteolysis of the talus, sclerosis, and osseous fragmentation (Figs. 21.1a–c and 21.2a–c).

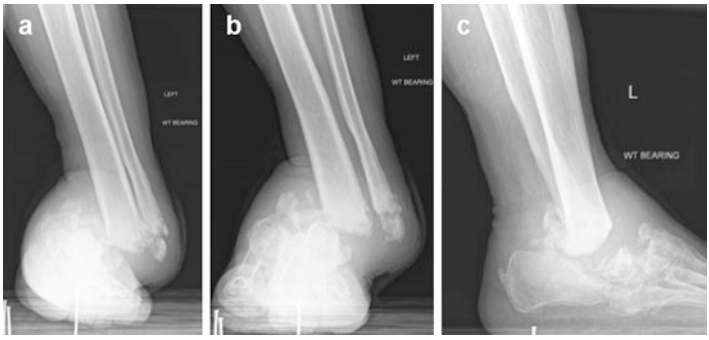

FIGURE 21.1 (**a**–**c**) Initial standing films of the ankle

FIGURE 21.2 (**a**–**c**) Initial standing films of the foot

Treatment Considerations

Charcot neuroarthropathy occurs in patients with peripheral neuropathy, most commonly due to diabetes. It is a destructive process with potentially devastating results that can lead to significant deformity, ulceration, infection, and even amputation [1]. Charcot is often confused with an infection, but one must realize that an underlying infection is relatively uncommon in a patient without an ulcer or a history of an ulcer [2]. If concomitant osteomyelitis is suspected, a MRI with contrast is indicated. The MRI will most likely show marrow edema, especially in the acute phase, but the findings are only consistent with osteomyelitis if there is an ulcer in communication with the bone marrow edema.

Immobilization and offloading are the mainstays of treatment in the early stages [1]. This is usually achieved with a total contact cast or a pneumatic CAM boot [3]. Significant activity modification should be recommended, and a period of nonweightbearing can be considered depending on the acuity [4]. The goal of the immobilization is to provide support so that the patient will advance from the acute fragmentation phase to the consolidation phase.

If the patient progresses to the consolidation phase without significant deformity, then a custom brace or orthosis is recommended [3]. If they are consolidated and have a minor deformity with a prominence that leads to ulceration, then an irrigation, debridement, or partial ostectomy is recommended [4]. A course of culture-specific antibiotics should also be administered postoperatively. If the ulceration is located on the plantar surface, then the patient should be examined for an equinus contracture and an Achilles lengthening should be performed in addition to the ostectomy [1].

Patients who develop significant deformities require corrective fusions. If there is an infection or ulceration, then external fixation should be utilized. In all other cases, internal fixation is the best option since it is biomechanically stronger. A standard tibiotalar fusion is usually not possible due to extensive bony destruction with avascularity or necrosis common, particularly of the talus. As a result, the surgeon must be ready to extend the fusion to the calcaneus. Extending the fusion across the subtalar joint may also allow for stronger fixation and lessen the chance of failure. If the talus is completely necrotic, then a talectomy is indicated, and a tibiocalcaneal fusion would be performed [5]. Moreover, the degree of deformity may require extending to a tibiotalocalcaneal or even a pantalar fusion. The fixation can be performed using plates, cannulated screws, or an intramedullary nail. A combination of these fixation methods can also be utilized and is at the discretion of the surgeon. Regardless of the choice of fixation, more fixation than usual is recommended due to the poor quality of bone and possibility of hardware failure.

Patients must understand the severity of their condition and adhere to the prescribed postoperative protocol. In many cases, the patient may be nonweightbearing for 2–3 months. Strict glycemic control is advised. The cessation of smoking is mandatory. Realistic expectations and the possibility of a permanent brace must be discussed with the patient. Lastly, the possibility of failure and the need for amputation should also be addressed with the patient.

Surgical Tact

The patient underwent talectomy and tibiocalcaneal fusion with plate fixation. The fusion was supplemented with iliac crest aspirate, distal fibula autologous bone graft, and an implantable bone stimulator (Fig. 21.3a–c).

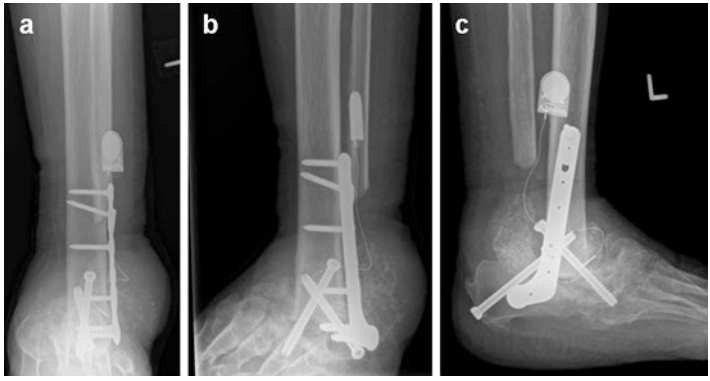

FIGURE 21.3 (**a**–**c**) Immediate postoperative films

Technique Specifics

The patient was placed in a semilateral decubitus position on a beanbag for the procedure, with the mini C-arm positioned on the ipsilateral side. The ankle was accessed laterally, through a lateral extensile approach. In this case, the majority of the talus was fragmented and eroded, so the devitalized bone was excised, leaving the tibia directly opposed to the calcaneus. The tibial and calcaneal surfaces were prepared with a sagittal saw. Two 8.0 mm crossed cannulated screws were used to achieve compression across the fusion mass. An (Integra Advansys) tibiocalcaneal plate was placed and fixed laterally. An excised segment of the fibula was morselized for bone graft and saturated with concentrated iliac crest bone marrow aspirate.

Postoperative Plan

The patient was made nonweightbearing in a short-leg cast for a period of 12 weeks. At this time, consolidation of the fusion mass was seen (Fig. 21.4a–c). Then the patient was made weightbearing as tolerated in a total contact cast for an additional 2 months before transitioning to a Charcot restraint

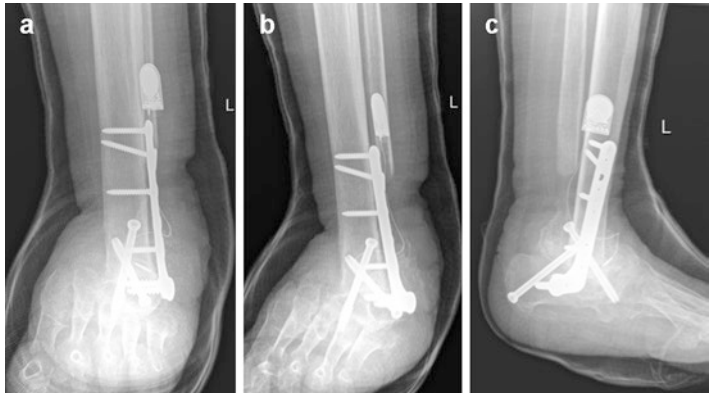

FIGURE 21.4 (**a**–**c**) 12-week postoperative films

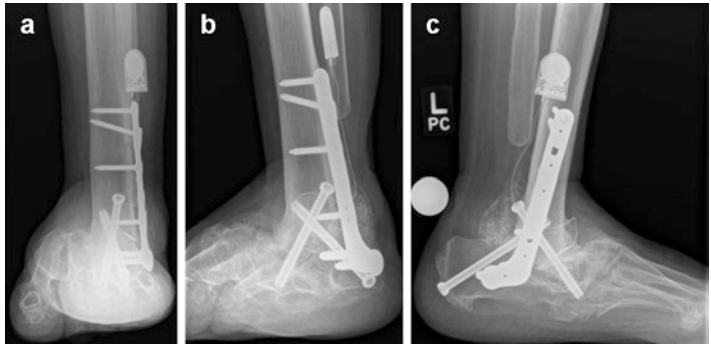

FIGURE 21.5 (**a**–**c**) 15-month postoperative films showing consolidation of the fusion and preserved alignment

orthotic walker (CROW) boot. At 15 months postoperatively, the patient continued to do well, with preserved alignment and fusion mass consolidation (Fig. 21.5a–c).

Salient Points/Pearls

- Goal of treatment: a stable limb that allows ambulation.
- Significant deformities require corrective fusions.

- Utilize more fixation than typical for nondiabetic/Charcot fusions.
- Be prepared to extend fusion to calcaneus.
- Progress slowly and recommend bracing with a CROW boot for at least 6 months as protection.

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